



Hospitalist bed management effecting throughput from the emergency department to the intensive care unit

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Abstract

Rationale: Emergency department (ED) patients in need of an intensive care unit (ICU) admission are very sick. Reducing the length of time to get these patients into ICU beds is associated with improved outcomes.

Objective: To reduce the ED length of stay for patients requiring admission to the medical ICU or coronary care unit through the implementation of the “active bed management” (ABM) intervention.

Methods: A pre-post study design compared data from November 2006 to February 2007 with those from those same months in the prior year at Johns Hopkins Bayview Medical Center in Baltimore. The ABM intervention was carried out by hospitalist physicians and involved: (i) making triage decisions for patients to be admitted and facilitating their transfer from ED to the appropriate care setting and (ii) having proactive management of Department of Medicine resources, which included twice-daily ICU bed management rounds and regular visits to the ED to assess flow.

Measurement: Throughput time for patients presenting to the ED requiring ICU admission was analyzed.

Main Results: The ED census was higher during the intervention period as compared with the control period, 17 573 versus 16 148 patients. Throughput from ED to coronary care unit and medical ICU beds was reduced by 99 (± 14) minutes (from 353 minutes in the control period to 254 minutes in the 4 months after the initiation of ABM, $P < .0001$). Staffing, length of stay, case mix index, ICU transfer rates, and ICU death rates were stable across the 2 periods, all $P =$ not significant.

Conclusion: Conscientious management of hospital beds, in this case by hospitalist physicians providing ABM, can have a positive and substantial impact on the ED throughput of critically ill patients admitted to ICU beds. This efficiency is likely to positively have impacted on patient satisfaction and safety.

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1. Introduction

Emergency departments (EDs) across the United States are in a state of crisis [1]. Ninety-one percent of EDs are overcrowded, with a staggering 40% reporting that this occurs every day [1]. A primary cause of ED crowding is inpatient *boarding*, which entails holding admitted patients in the ED until the hospital bed becomes available [2-6]. In the Institute of Medicine's report describing dysfunction within EDs, most of the proposed solutions concentrated on factors within EDs themselves [1]. However, one strategy focused on hospital processes and efficiency as a way to ameliorate crowding in the EDs. Clearly, boarding does not benefit any workflow process in EDs, and this practice may be particularly dangerous for those who are critically ill and are waiting for an intensive care unit (ICU) bed [4,6].

Critical care patients are the sickest of the sick hospitalized patients. In-hospital mortality has been estimated to be as high as 30% [7], and more than \$70 billion is spent caring for these complex patients annually in this country [8]. Notably, critical care patients waiting for an ICU bed in the ED for extended periods of time have longer hospital stays and higher mortality rates compared with patients who are transferred to the ICU more expeditiously [4,9,10].

Hospitalist physician groups, internists specializing in the care of hospitalized patients, are now ubiquitous [11]. By nature of their work in coordinating patient care from admission through discharge, hospitalists are uniquely positioned and well integrated into hospital systems such that they can influence efficiency. Our group of hospitalists partnered with the ED and developed a quality improvement initiative to address the problem of crowding and boarding in our ED. The primary objective of this initiative was to design a system that facilitated the safe and efficient transfer of patients from the ED to the appropriate inpatient setting. This article describes the impact of the "active bed management" (ABM) initiative on the throughput times for critically ill patients moving from the ED to ICU beds.

2. Methods

2.1. Setting and study design

This study took place at Johns Hopkins Bayview Medical Center, a 335-bed university-affiliated medical center in Baltimore, Md. The ED is a designated level II adult trauma center, adult burn center, and primary stroke center. With a capacity for 30 primary treatment rooms, the ED registered 54 607 visits in the fiscal year ending June 2007. Historically, approximately 25% of the ED registered patients are admitted, and this makes up 61% of the hospital's total admissions.

Using a pre-post design, we compared the throughput times from ED triage until patient arrival to an ICU bed, as well as other related ICU variables, from the 4 months after the implementation of the intervention (November 2006-February 2007) to the data from those same months in the prior year (November 2005-February 2006). This study was exempt by the institutional review board.

2.2. ABM intervention

Before ABM, admitted medical patients were assigned to one of the Department of Medicine inpatient services (eg, cardiac ICU [coronary care unit, or CCU], medical ICU [MICU], and general medicine units) by the ED. Because of the high frequency with which ambulances were being diverted away from our ED, this intervention was designed and implemented. Ambulances are diverted when an ED is on *red alert* (the designation used when a hospital does not have any electrocardiography monitored/critical care beds available) or *yellow alert* (ED experiencing a temporary overwhelming overload such that priority II or III patients may not be managed safely).

Active bed management, performed in 12-hour shifts, is coordinated and staffed solely by the hospitalist service and is in effect 24 hours a day, 7 days a week. All hospitalists in the division rotate through the ABM role. The hospitalist group was expanded by 3 additional physician full time equivalents, and this made it possible for a physician to be freed up from all other clinical care duties, such that their only clinical responsibility is the facilitation of the ABM processes. The details of the intervention have been described previously [12]. Active bed management was strategically designed around 2 fundamental functions: (a) evaluation and assignment of all departmental admissions and (b) proactive management of department of medicine resources.

(a) Evaluation and assignment of new admissions to the Department of Medicine inpatient clinical settings: the ABM hospitalist makes collaborative triage decisions about the optimal clinical setting for each patient who requires admission through consultation with all admitting physicians (predominantly ED physicians) initially by telephone. After collecting pertinent clinical data, the hospitalist determines the need to evaluate select ED patients in person. Authority to make determinations on the assignment of patients to beds in the various services within the medicine department has been granted by the Department Chairman.

As part of the intervention, new expectations were established about time intervals related to sending patients upstairs. Once the hospitalist accepts the admission, non-ICU admissions are transferred to the inpatient floor as soon as a bed is available. Intensive care unit admissions are transferred up to the unit no longer than 90 minutes after the disposition decision has been made. This brief interval gives ICU teams time to ready themselves and stabilize other

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